

CEITEC – Central European Institute of Technology, Brno University of Technology would like to inform you about the on-coming lecture:

Prof. H. Daniel Wagner

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Israel)

Inspirational multiscale biological composites

26/05/2016

**Meeting Room S2.02
CEITEC BUT, Building "S"
Brno, Purkyňova 123**

 **Thursday, 10:00**

The biological world is replete with composite structures of various kinds, which could be teaching us important lessons in terms of assemblies sophistication and ensuing mechanical property optimization. For example, in nature high toughness is generally provided by means of multiscale (from nano to macro) fibrous composites, rather than with composite structures at a single scale. This will be illustrated by means of examples taken from our recent research with synthetic layered structures based on the turtle carapace [1,2], sponge spicules [3,4], and tendon-like multiscale unidirectional structures [5-8].

1. B. Achrai, B. Bar-On, H.D. Wagner, "Biological armors under impact - Effect of keratin coating and synthetic bio-inspired analogues", *Bioinspiration & Biomimetics*, 10 (2015) 016009.
2. B. Achrai, H. Daniel Wagner, "The red-eared slider turtle carapace under fatigue loading: the effect of rib-suture arrangement", *Materials Science and Engineering C* 53 (2015), 128–133.
3. K. Livanov, H. Jelitto, K. Schulte, G.A. Schneider, H.D. Wagner, "Tough Al₂O₃/polymer layered composites with high ceramic content", *Journal of the American Ceramic Society* 98(4) (2015), 1285-1291.
4. K. Livanov, L. Yang, A. Nissenbaum, H.D. Wagner, "Interphase tuning for stronger and tougher composites", *Scientific Reports*, In Press (2016), 256.
5. B. Bar-On, H.D. Wagner, "Structural motifs and elastic properties of hierarchical biological tissues - A review", *Journal of Structural Biology* 183 (2013), 149–164.
6. I. Greenfeld, H.D. Wagner, "Nanocomposite toughness, strength and stiffness - the role of filler geometry", *Nanocomposites* 1 (2015), 3-17.
7. X.-M. Sui, I. Greenfeld, H. Cohen, X.H. Zhang, Q.W. Li, H.D. Wagner, "Multilevel composite using carbon nanotube fibers", Submitted (2015).
8. H.D. Wagner, P. Ajayan, K. Schulte, "Nanocomposite toughness from a pull-out mechanism", *Composites Science and Technology* 83 (2013), 27-31.